

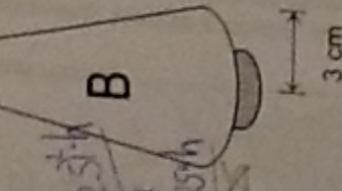
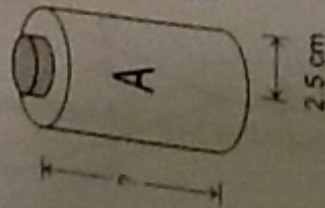
any glue is made by mixing two substances. These substances are stored in separate containers.

Volume of cylinder
 $\pi R^2 h$

Substance A is stored in a cylindrical bottle. The radius of the cylinder is 2.5 cm.

Substance B is stored in a cone-shaped tube. The radius of the base of the cone is 3 cm. The height of the cone is 15 cm.

Vol of cone
 $\frac{\pi R^2 h}{3}$



(9)

The cylinder and the cone are equivalent.

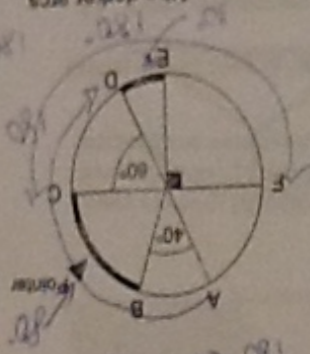
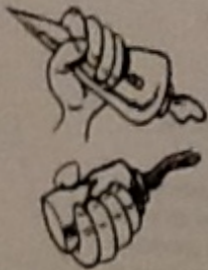
What is the height of the cylinder?

7.2 cm

9.2 cm

C) 10.8 cm

D) 12.5 cm



9. A wheel of fortune is shown in the figure on the right.

Segments AD and FC are diameters. Arcs BC and DE are darker than the other arcs.

A contestant spins the wheel of fortune. Chance determines where it will stop.

What is the probability that the pointer will be pointing at one of the darker arcs when the wheel stops spinning?

A) $\frac{5}{18}$

B) $\frac{11}{36}$

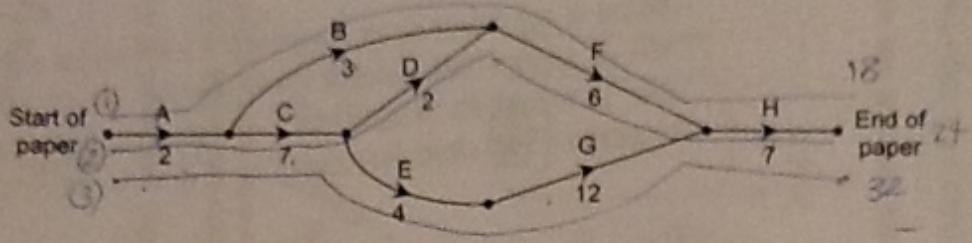
C) $\frac{3}{1}$

D) $\frac{13}{36}$

$180 - 60 - 80 = 40$
 $180 - 60 - 110 = 10$
 $\frac{110}{360} = \frac{11}{36}$

MY COPY

4) The following graph represents the different steps involved in producing a paper. The number on each edge indicates the time, in hours, required to complete the corresponding step. The direction of the arrows indicates the order in which the steps must be performed. Some steps can be carried out at the same time.

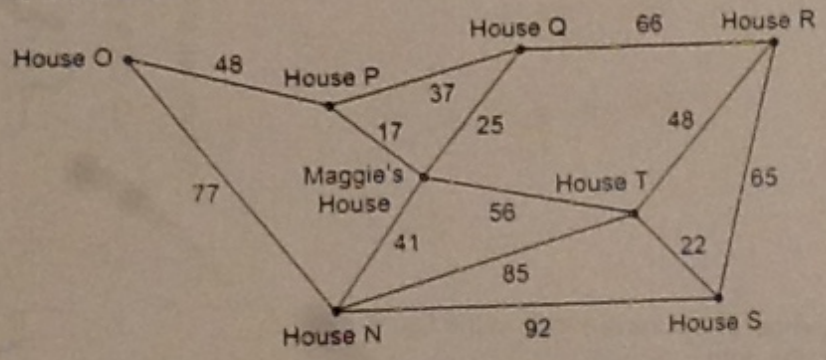


What is the minimum amount of time required to complete all the steps involved in producing this research paper?

- A) 18 hours
- B) 24 hours
- C) 32 hours
- D) 43 hours

5) 1. Maggie delivers newspapers to earn pocket money.

In the graph below, one of the vertices represents Maggie's house, and the others represent the houses in one of the areas where she must deliver newspapers. The value on each edge indicates the number of metres Maggie must walk to get from one house to another.



Every morning, Maggie leaves home, delivers her newspapers and returns home. Since she has to carry a heavy bag of newspapers, she wants to minimize the distance she must walk to deliver them.

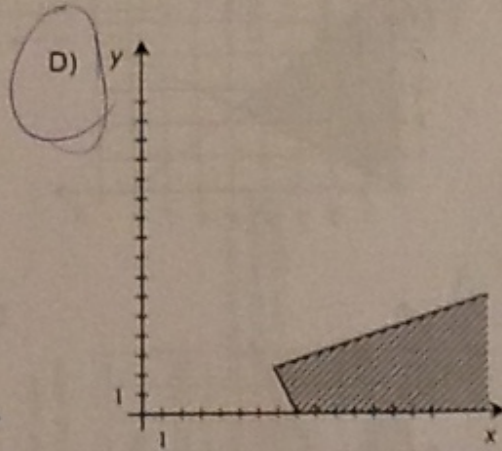
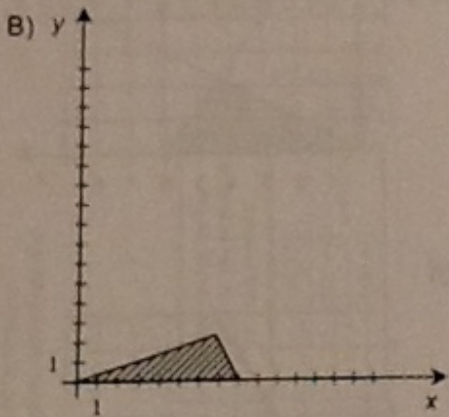
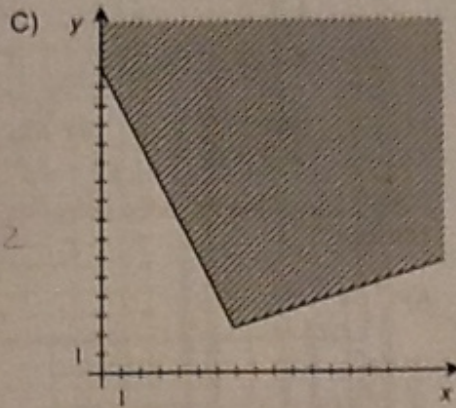
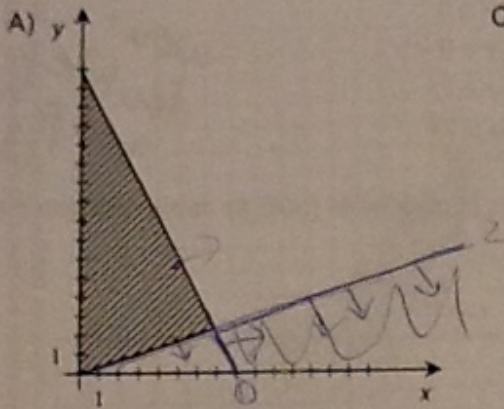
What should Maggie be looking for in this graph?

- A) A tree of minimum value
- B) A tree of maximum value
- C) A circuit of minimum value
- D) A circuit of maximum value

2)

$x \geq 0$
 $y \geq 0$
 $2x + y \geq 16$ above
 $x \geq 3y$ below

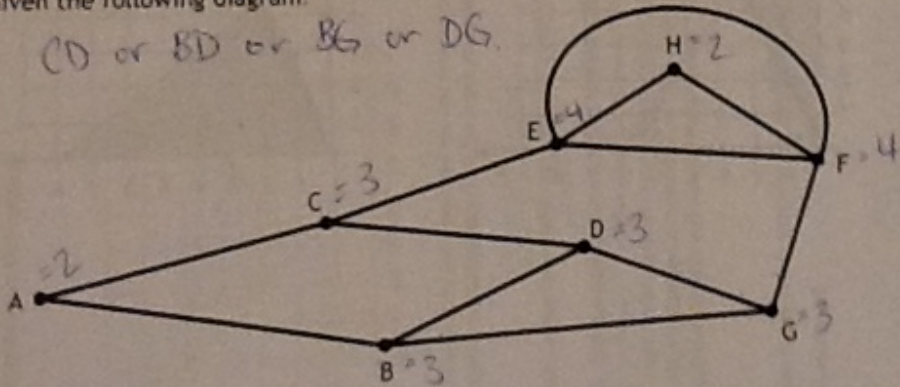
Which graph represents this situation?



3)

Given the following diagram:

CD or BD or BG or DG.



Name one edge that would need to be removed in order to create an Euler path.

Exactly 2 odd degrees

1) The following system of inequalities represents the constraints related to an optimization situation.

CST SEC V 2012-13

Exam Review #6

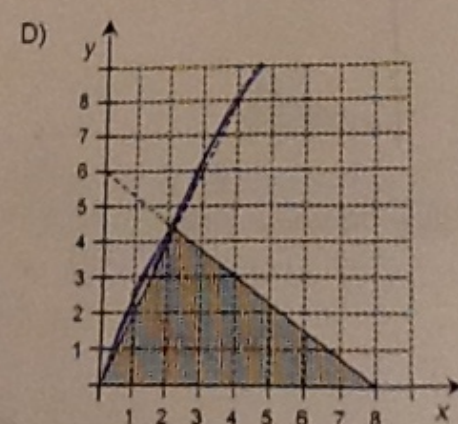
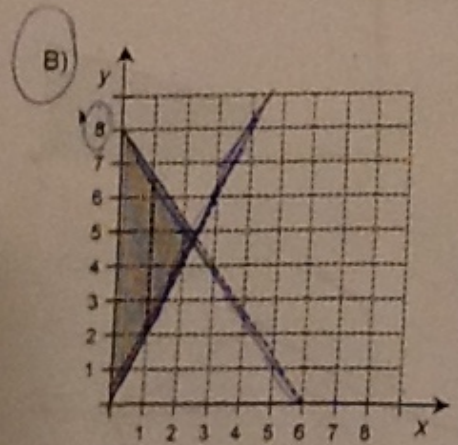
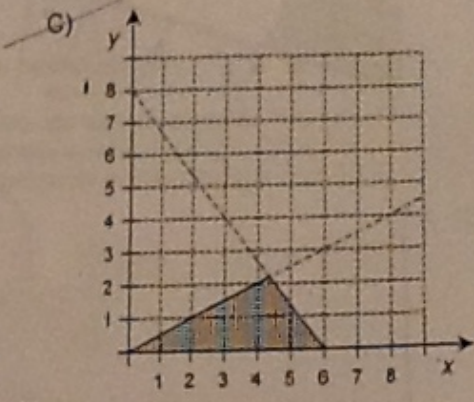
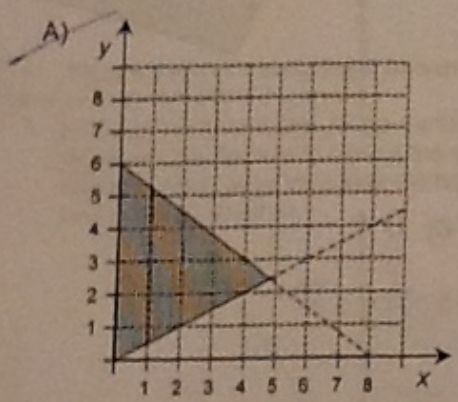
4) The following system of inequalities represents the constraints related to an optimization situation.

$$\begin{aligned}
 x &\geq 0 \\
 y &\geq 0 \\
 y &\geq 2x \\
 4x + 3y &\leq 24
 \end{aligned}$$

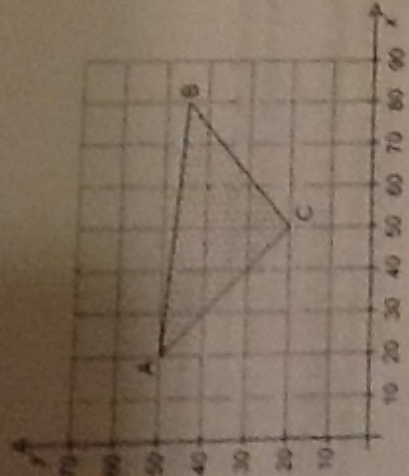
y-intercept when x=0 $\rightarrow 3y=24$
 $y=8$

wow double graph different

Which one of the following polygons of constraints could be associated with this situation?



Several possibilities in this regard



COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS	
A	(20, 50)
B	(80, 45)
C	(50, 20)

4350
7325
4050

- x : number of hours required for car maintenance per week
- y : number of hours required for truck maintenance per week

Maintenance costs are \$55/h for cars and \$65/h for trucks
 $C = 55x + 65y$
 last week, the company minimized its vehicle maintenance costs

because major mechanical breakdowns occurred this week, the time required for vehicle maintenance increased. The time required for car maintenance increased by 10 h compared with last week. As a result, vehicle maintenance costs reached \$5900

How many hours were required for truck maintenance this week?

Show all your work

New:

$$C = 55x + 65y$$

$$5900 = 55(50 + 10) + 65y$$

$$5900 = 3300 + 65y$$

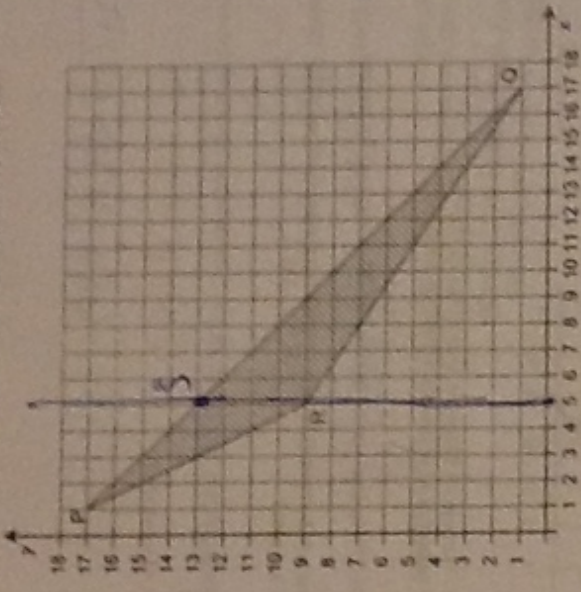
$$2600 = 65y$$

$$\frac{2600}{65} = y$$

$$y = 40$$

22. Two industrial robots are used in an auto production plant. There are certain constraints that limit the amount of time these robots can be used.

Polygon of constraints PQRP represents this situation



COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS	
P	(1, 17)
Q	(17, 9)
R	(15, 9)

- x : number of hours Robot A is used, per day
- y : number of hours Robot B is used, per day

$P = 60x + 50y$

The expression $60x + 50y$ is used to calculate the daily profits generated by the use of these robots

Robot A cannot be used for more than 5 hours today because it must undergo routine maintenance. This additional constraint changes the maximum profit that can be earned

What is the difference between the usual maximum profit and today's maximum profit?

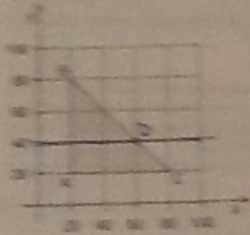
Show all your work

$1070 - 50 = 1020$

MY COPY

A summer theater is putting on a comedy. As part of a promotional campaign, the theater has reduced ticket prices for the Thursday evening and Sunday evening performances. Some tickets cost \$5, and the rest cost \$10.

Different constraints limit the number of tickets of each type that can be sold for each of the two performances. Polygon of constraints ABC below represents the different possibilities.



- x = number of \$5 tickets sold
- y = number of \$10 tickets sold

COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS	
A (20, 20)	200
B (20, 40)	400
C (50, 20)	600
D (20, 40)	700

A new constraint has been added: only a maximum of 40 tickets priced at \$10 each can be sold for a Sunday evening performance.

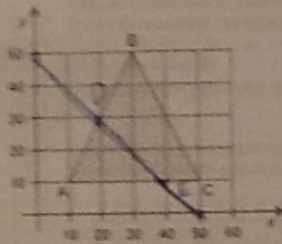
In dollars, what is the difference between the maximum possible revenue for Thursday evening and the maximum possible revenue for Sunday evening?

Show all your work.

$R = 5x + 10y$
 $900 - 700 = 200$

#3

The students in an elementary school have been invited to sign up for one of the following activities: dance or soccer. There are constraints on the number of students who can sign up for these activities. Polygon of constraints ABC below represents the different possibilities in this regard.



- x = number of students signed up for dance
- y = number of students signed up for soccer

$C = 10x + 7y$

It costs \$10 to sign up for dance and \$7 to sign up for soccer.

Because of budget cuts, only a total maximum number of 50 students can sign up for these activities.

By how much will the maximum possible revenue decrease because of these budget cuts?

Show all your work.

Complete same form
 $650 - 470 = 180$

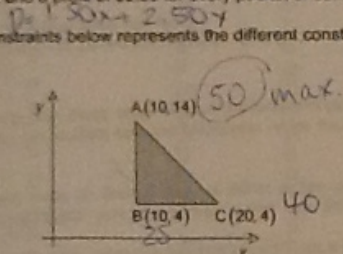
COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS	
A (10, 10)	170
B (30, 50)	650
C (50, 10)	570
D (20, 30)	40
E (40, 10)	470

#6

Complete Problem

100 members of a sports club participated in a fundraising campaign. They sold chocolate bars and packets of coffee. They made a profit of \$1.50 for each chocolate bar sold and a profit of \$2.50 for every packet of coffee sold.

The polygon of constraints below represents the different constraints faced by each member.



x: number of chocolate bars sold by each member
y: number of packets of coffee sold by each member

Each club member made the maximum possible profit. This campaign enabled them to raise a total of \$800.

How many members does this club have?

Show all your work.

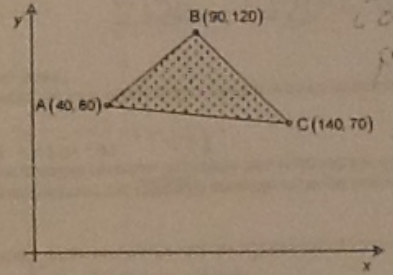
$$800 = 1.50x + 2.50y$$

16

#7

During a soccer game, the sponsor of a team offers each spectator a free beverage. Each person can choose fruit juice or a soft drink.

There are certain constraints on the number of beverages that can be served. The following polygon of constraints is associated with this situation.



x: number of bottles of fruit juice served
y: number of soft drinks served

The sponsor wants to serve as many beverages as possible.

It costs the sponsor \$0.60 per bottle of fruit juice and \$0.40 per soft drink.

What is the minimum cost to the sponsor if the goal is to serve as many beverages as possible?

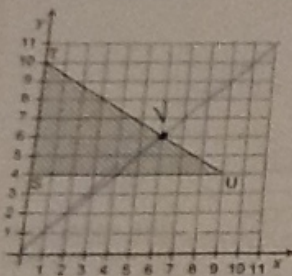
Show all your work.

CONFUSING

#4

Suzanne owns a small boat that she uses to take tourists on excursions around the islands where she lives.

Polygon of constraints STU below represents the different possible combinations of child and adult passengers that can be on her boat.



COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS

S(0, 4)	80
T(0, 10)	580
U(9, 4)	560 440
V(6, 6)	

max →

x: number of child passengers on the boat
y: number of adult passengers on the boat

$$P = 40x + 50y - 120$$

Suzanne charges \$40 per child passenger and \$50 per adult passenger. She offers a 6-hour excursion and her expenses are \$20 per hour, for a total of \$120.

A new water safety regulation has come into effect. The number of adult passengers on the boat must be greater than or equal to the number of child passengers.

$$y \geq x$$

Suzanne wants to offer the longest possible excursion, while earning the same maximum possible profit she could make before the new regulation came into effect.

n hours, what is the duration of the longest excursion that Suzanne has been able to offer since the new regulation came into effect?

Show all your work.

$$440 = 40(6) + 50(6) - ?$$

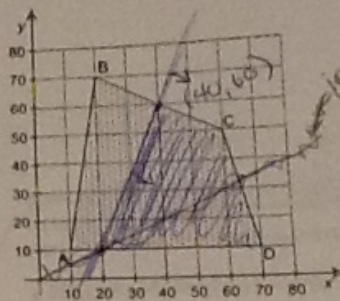
$$440 = 540 - ?$$

$$\$100 = ?$$

$$\frac{5 \text{ hours } 100}{20}$$

#5

An arena rents its skating rink for hockey or figure skating. There are constraints on the number of hours per week the rink can be rented for each of these sports. Polygon of constraints ABCD below represents the different possibilities in this regard.



COORDINATES OF THE VERTICES OF THE POLYGON OF CONSTRAINTS

A(10, 10)	1750
B(20, 70)	7250
C(60, 50)	9750
D(70, 10)	7750

Can (20, 10) 1750 2750

x: number of hours per week the rink is rented for hockey
y: number of hours per week the rink is rented for figure skating

$$R = 100x + 75y$$

The arena earns \$100/h when renting the rink for hockey and \$75/h when renting it for figure skating.

Unfortunately, the arena earned the minimum possible revenue last week. To increase its minimum possible revenue, the arena has imposed the following new constraint this week: $y \leq 2.5x - 40$.

With this new constraint, by how many dollars will the arena's minimum possible revenue increase this week?

Show all your work.

$$2750 - 1750 = 1000$$

1000